CLAIMS

What is claimed is:

1. In a reduction mill susceptible to damage by a non-frangible foreign object included within reducible material fed into the reduction mill along a predetermined path via a conveyor means, protective apparatus for providing a signal indicative of the presence of the non-frangible foreign object at a predetermined location along the predetermined path, comprising:

at least one sensing surface for traversing the flow of reducible material in said reduction mill and for receiving impactions of reducible material and foreign objects;

means for mounting said at least one sensing surface in operative relationship to said conveyor means and including means for vibrationally isolating said sensing surface from said reduction mill;

piezoelectric transducer means attached to said at least one sensing surface for providing output signals representative of the impactions of the foreign objects and the reducible material;

means coupled to said piezoelectric transducer means for selecting said foreign object impact signal from other signals

coupled thereto; and

means coupled to said selection means responsive to said foreign object impact signal for generating a utilization signal useful for indicating the presence of said foreign object.

2. The apparatus according to claim 1 wherein said selection means includes filter means coupled to said transducer means for selecting electrical signals within a predetermined bandwidth; and

said utilization signal generator means includes threshold comparator means coupled to said filter means for receiving the output signal of said filter means and for providing a signal representative of a foreign object in said reducible material when the output signal of said filter means exceeds a predetermined threshold value.

3. The apparatus according to claim 1 wherein said selection means includes first and second filter means coupled to said piezoelectric transducer means for providing electrical output signals; and said utilization signal generator means includes difference amplifier means coupled to receive said output signal from said first and second filter means for comparing said respective output signals and providing a signal

representative of a foreign object in said reducible material.

4. The apparatus according to claim 2 wherein said sensing surface includes a single bar disposed within the reduction mill and traversing the width of the reducible material flow.

5. The apparatus according to claim 3 wherein said sensing surface includes a single bar disposed within the conveyor means and traversing the width of the reducible material flow.

6. The apparatus according to claim 2 wherein said sensing surface includes first and second bars for generating acoustic signals in response to impacts by said foreign object and said reducible material, each coupled to said piezolectric transducer means for conversion to electrical signals representative of said foreign object and reducible material impacts.

7. The apparatus according to claim 3 wherein said sensing surface includes first and second bars for generating acoustic signals in response to impacts by said foreign object and said reducible material, each coupled to said piezoelectric transducer means for conversion to electrical signals representative of said foreign object and reducible material impacts.

8. The apparatus according to claim 7 wherein said electrical signals representative of said foreign object impacts provide a control signal to said reduction mill for reversing the direction of at least one conveyor;

thereby conveying the flow of said material away from a hammer roll.